



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

# Transforming Key African Farming Systems through Sustainable Intensification

Can Sustainable  
Agricultural  
Intensification  
Feed the World?

USDA Ag Outlook  
Forum

23 February 2012



Jerry Glover

Bureau for Food Security

USAID

[jglover@usaid.gov](mailto:jglover@usaid.gov)

Too little:

Food and Agriculture Organization (2010)

Over 1 billion people classified as  
'urgently hungry.'

Too much:

Millennium Ecosystem Assessment (2005)

“...largest threat to biodiversity and ecosystem function of any single human activity.”

Green Revolution =  
Improved seeds + inputs + water

Most successful with good  
soils, abundant water

Failed to address some social  
and environmental issues



## Africa:

- >80% soils with serious limitations
- 95% rainfed
- High variability
- Low input investment



**Africa RISING** [www.africa-rising.wikispaces.com](http://www.africa-rising.wikispaces.com)

Africa Research In Sustainable Intensification for the Next Generation

# Transforming Key African Farming Systems through Sustainable Intensification

Africa RISING [www.africa-rising.wikispaces.com](http://www.africa-rising.wikispaces.com)

Africa Research In Sustainable Intensification for the Next Generation

Transforming Key African Farming Systems  
through Sustainable Intensification

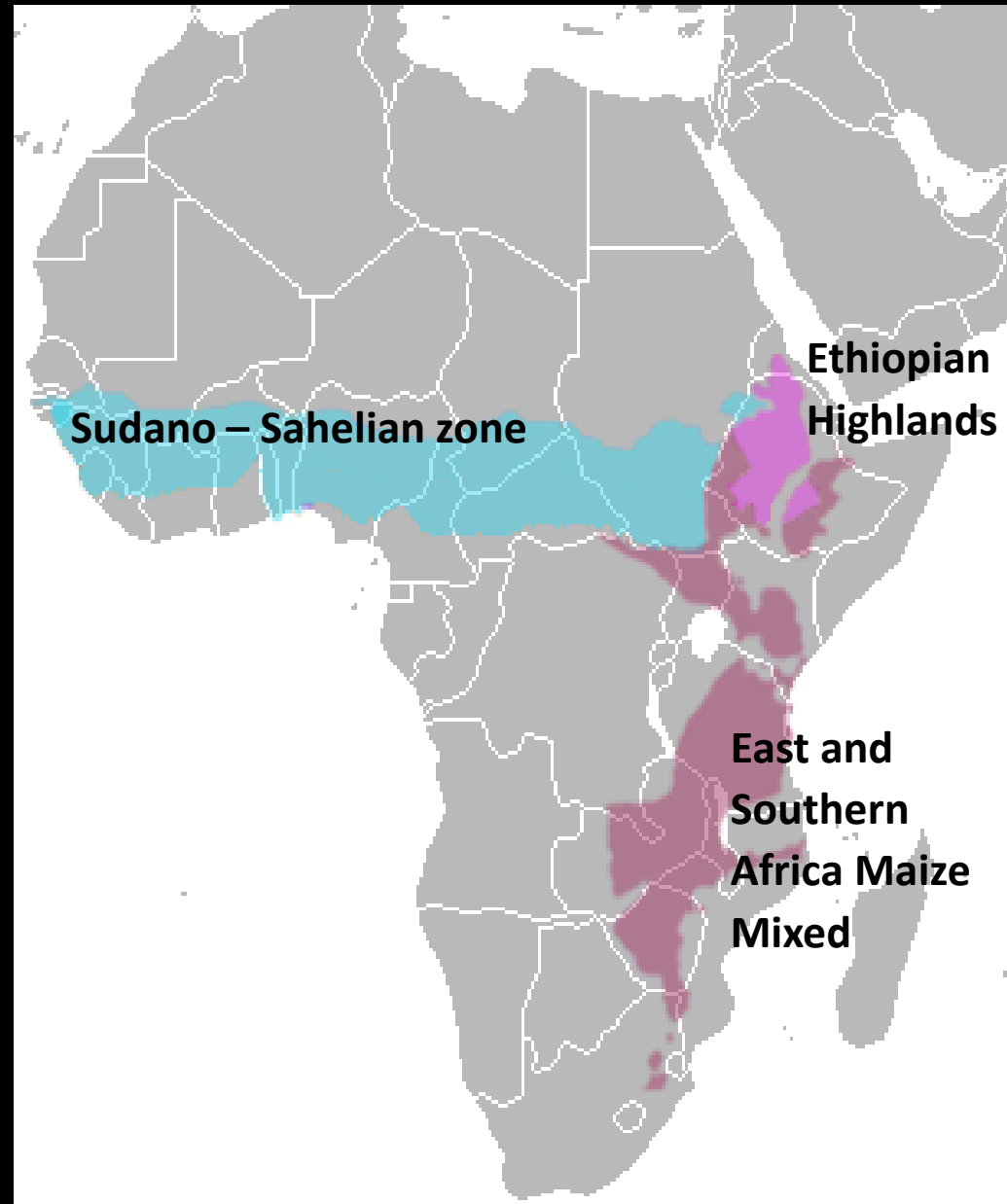


## Research for development of TRANSFORMING options for small-holder farmers

- Meet multiple needs at multiple scales (includes social, economic, nutrition, gender, natural resource management issues)
- Go beyond trade-offs
- Adaptable & adoptable

## KEY FARMING SYSTEMS in 3 regions

- High poverty
- High population
- Medium – high agriculture potential



## SUSTAINABLE INTENSIFICATION

- While increasing productivity and/or reducing risk:
- Utilize ecological processes (e.g., biological N fixation, natural predators)
- Minimize environmental hazards
- Maintain soil & water quality
- Use modern & traditional strategies
- Acknowledge local environmental & cultural conditions

# Africa RISING [www.africa-rising.wikispaces.com](http://www.africa-rising.wikispaces.com)

## Illustrative examples:

- 'Push-pull' management of pests and weeds
- Evergreen Agriculture
- Doubled-up maize-legume systems

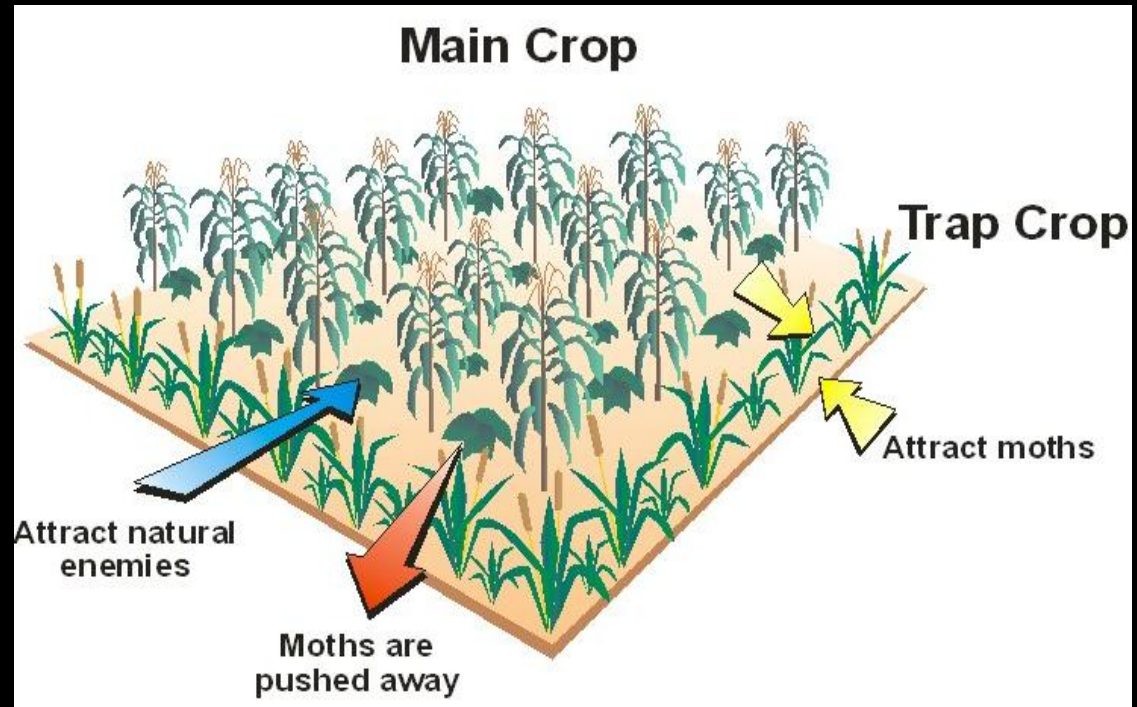
# 'Push-pull' management of stem-borers and *Striga* weeds

## *Desmodium*:

- N-fixing perennial
- Intercropped with maize
- "Pushes" *Striga* and stemborer moths
- "Pulls" natural enemies

## *Napier* grass:

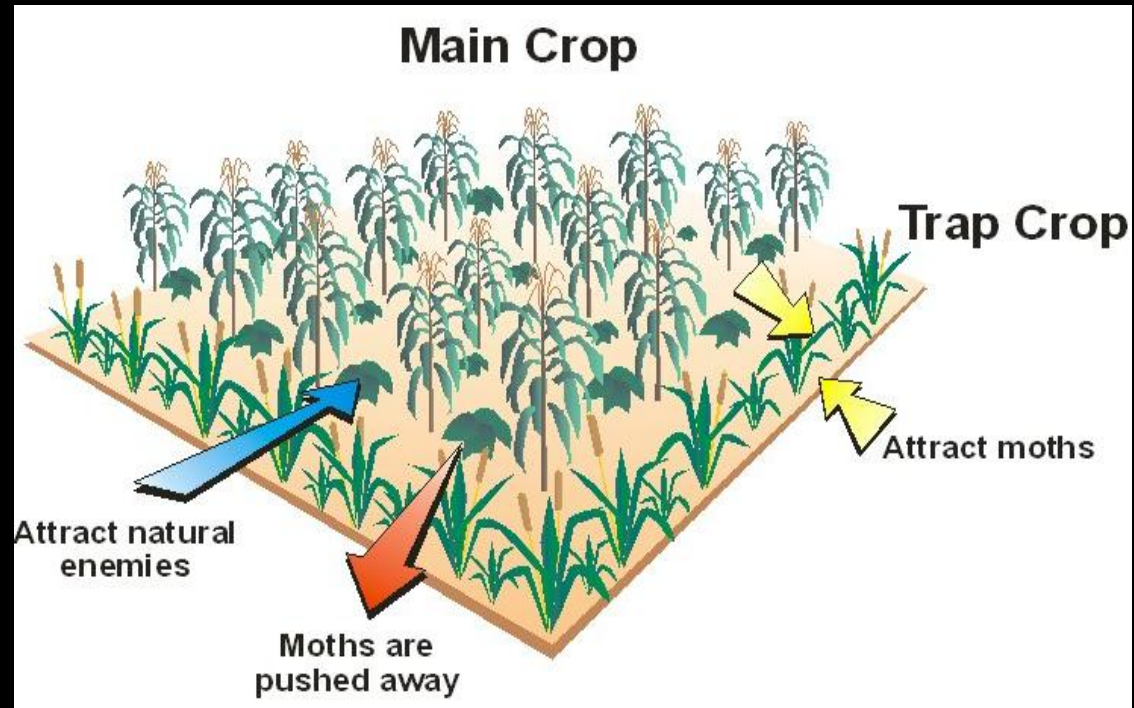
- Perennial forage crop
- Planted around field
- "Pulls" stemborer females



# 'Push-pull' management of stem-borers and *Striga* weeds

## Benefits

- 3.5X greater maize yields
- Locally available crops
- Reduced external inputs
- Increased livestock forage production
- Improved soil fertility & moisture retention
- Adopted on 30,000 farms



# Evergreen Agriculture

- Intercropping of trees in annual crop fields
- Low investment costs
- Often use N-fixing trees
- Complementary growing seasons & resource use



(Garrity et al. 2010)

# Evergreen Agriculture

## Benefits

- 4X greater maize yields
- Better yields in high & low rainfall years
- Enables farm investment
- Increased fuel & forage production
- Improved soil fertility & moisture retention
- Adopted on >5 m ha



(Garrity et al. 2010)



# Doubled-up Maize/Legume Systems

- Yr 1: Intercrop soybean & shrubby pigeonpea
- Yr 2: Pigeonpea regrows in planted maize

Pigeonpea

Soybean



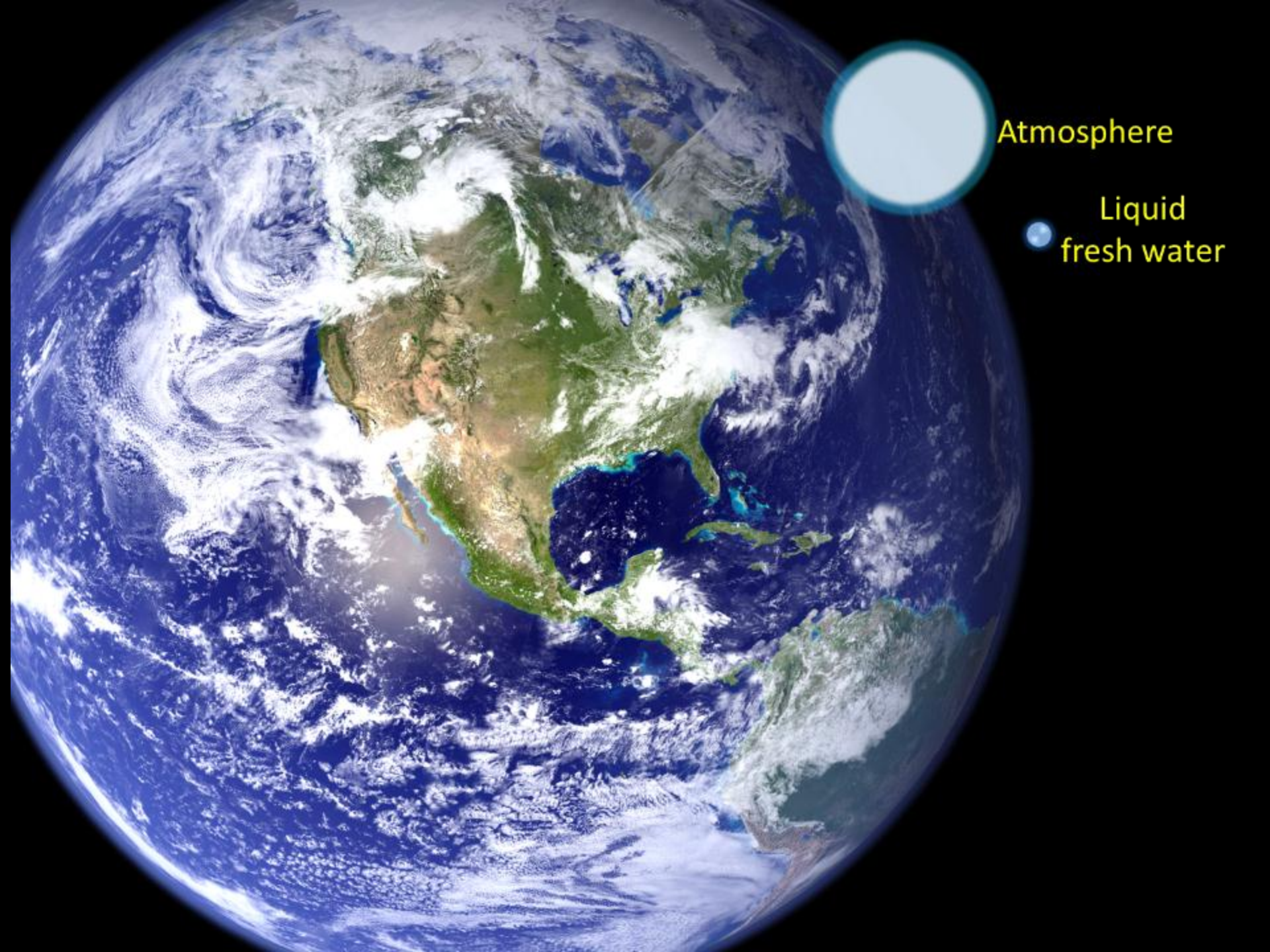
# Doubled-up Maize/Legume Systems

## Benefits

- Same maize yields with  $\frac{1}{2}$  the fertilizer
- 50% greater protein yield
- Permanent soil cover
- Decreased risk, labor requirements
- Livestock fodder production
- >8,000 adopters in Malawi

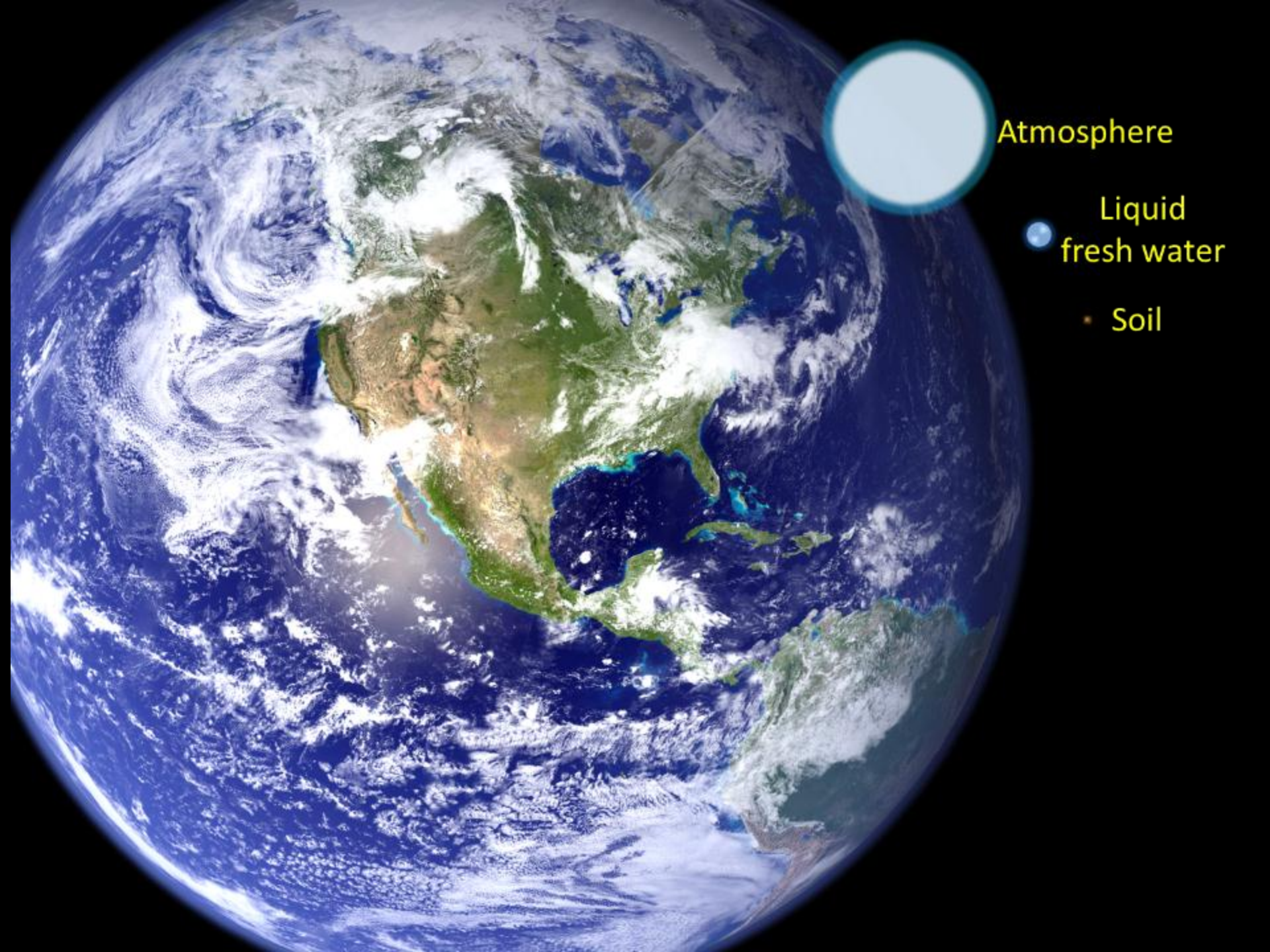


**Can Sustainable  
Agricultural Intensification  
Feed the World?**



Atmosphere

Liquid  
fresh water



Atmosphere



Liquid  
fresh water



Soil



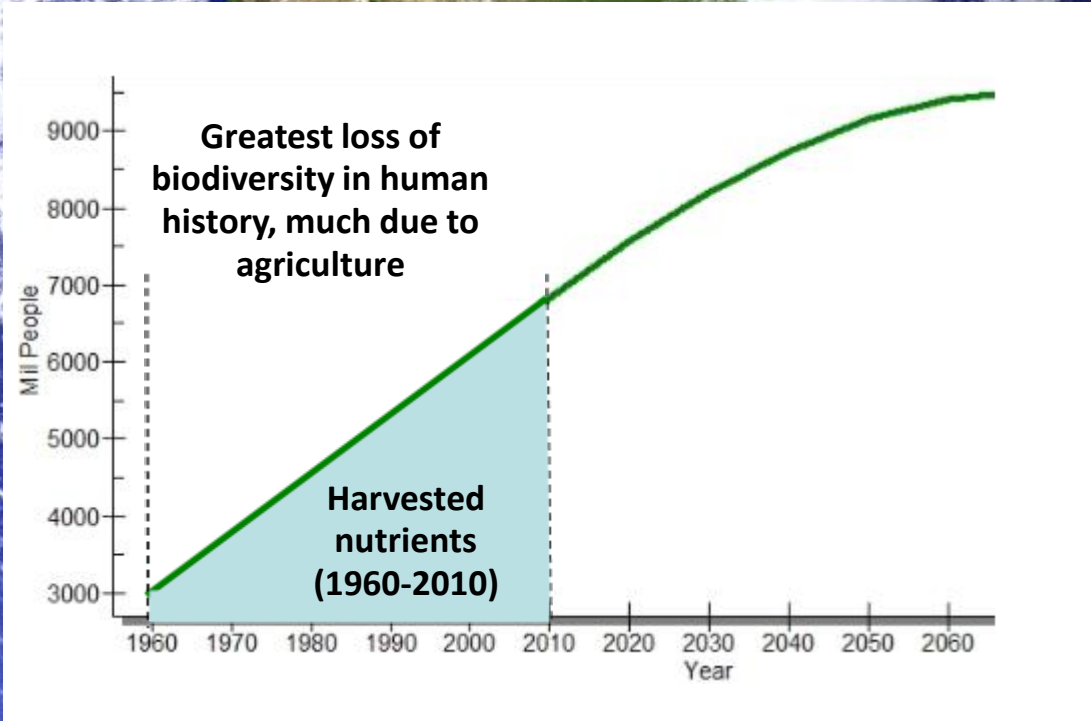
Atmosphere



Liquid  
fresh water



Soil



Atmosphere

Liquid  
fresh water

• Soil

